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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/664,435	09/18/2000	Takashi Iwade	H9876.0055/P055	4783

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EXAMINER
YANG, RYAN R

ART UNIT	PAPER NUMBER
2672	

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11

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _25 September 2003_ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1,3,4,6,7,9-12_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1,3,4,6,7 and 9-12_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

        1.☒ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____ .

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)   4)☐ Interview Summary (PTO-413) Paper No(s). _____ .

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)   5)☐ Notice of Informal Patent Application (PTO-152)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .   6)☐ Other: .

DETAILED ACTION

Continued Prosecution Application

1.   The request filed on 9/25/2003 for a Continued Prosecution Application (CPA)

under 37 CFR 1.53(d) based on parent Application No. 09/664,435 is acceptable and a

CPA has been established. An action on the CPA follows.

2.   This action is responsive to communications: Amendment, filed on 9/25/03.

This action is non-final.

3.   Claims 1, 3-4, 6-7 and 9-12 are pending in this application. Claims 1, 3-4, 6-7

and 9 are independent claims. In the Amendment, filed on 9/25/03, claims 1, 3, 4, 6, 7

and 9 were amended, claims 2, 5 and 8 were canceled, and claims 10-12 were added.

This application claims foreign priority dated 9/16/1999.

4.   The present title of the invention is "Method of forming polygon image and image

processing apparatus using the same" as filed originally.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6.   Claims 1, 4, 7 and 10-12 are rejected under 35 U.S.C. 102(e) as being

anticipated by Higashiyama et al. (US 2002/0047843).

As per claim 1, Higashiyama et al., hereinafter Higashiyama, discloses a method

of forming a polygon image, comprising the steps of:

obtaining a plurality of polygons having normal line data as apex data and

constituting a model ("Vertex normal vectors when the polygon for which the shadow is

to be created is located in the simulated 3D space are obtained", [0040] line 5-7);

sorting the plurality of polygons into polygons of a first color part and polygons of

a second color part along a boundary line between said first and second color parts

according to the direction of a light source and normal lines of the plurality of polygons

("The 3D image processing apparatus comprises vertex sorting means for sorting the

respective vertices of the polygons forming the solid model into visible-surface vertices

facing in a direction toward a light source and hidden-surface vertices facing in a

direction opposite from the light source", [0076] line 4-8);

dividing polygons intersecting the boundary line along the boundary line (Figure

5A where the edge of the polygons formed is the edge of the boundary line);

sorting the divided polygons into polygons of the first color part and polygons of

the second color part along the boundary line according to the direction of a light source

and normal lines of the divided polygons ("It can be seen that if an inner product of the

normal vector V2 at the vertex and the light source vector V1 is positive, i.e. an X-

component of the normal vector V2 at this vertex is facing in the same direction as the

light source vector V1, this vertex is a hidden-surface vertex M02", [0056] line 7-12);

and

pasting up the first mono-color texture on the polygons belonging to the first color

part and the second mono-color texture on the polygons belonging to the second color

part ("The image processor 12 positions polygons forming an image to be formed in a

display area of the RAM 8 and applies rendering such as texture mapping to these

polygons based on the calculation result of the signal processor 11", [0018] where

pasting is part of rendering process).

7.   As per claim 4, Higashiyama discloses an image processing apparatus

comprising:

control means for obtaining a plurality of polygons having normal line data as

apex data and constituting a model ("Vertex normal vectors when the polygon for which

the shadow is to be created is located in the simulated 3D space are obtained", [0040]

line 5-7), sorting the plurality of polygons into polygons of a first color part and polygons

of a second color part along a boundary line between said first and second color parts,

according to the direction of a light source and normal lines of the plurality of polygons

("It can be seen that if an inner product of the normal vector V2 at the vertex and the

light source vector V1 is positive, i.e. an X-component of the normal vector V2 at this

vertex is facing in the same direction as the light source vector V1, this vertex is a

hidden-surface vertex M02", [0056] line 7-12);

dividing polygons intersecting the boundary line along the boundary lines (Figure

5A where the edge of the polygons formed is the edge of the boundary line), and

sorting the divided polygons into polygons of the first color part and polygons of the second color part along the boundary line according to the direction of a light source and normal lines of the divided polygons ("It can be seen that if an inner product of the normal vector V2 at the vertex and the light source vector V1 is positive, i.e. an X-component of the normal vector V2 at this vertex is facing in the same direction as the light source vector V1, this vertex is a hidden-surface vertex M02", [0056] line 7-12); and

a rendering processor for pasting up the first mono-color texture on the polygons belonging to the first color part and the second mono-color texture on the polygons belonging to the second color part ("The image processor 12 positions polygons forming an image to be formed in a display area of the RAM 8 and applies rendering such as texture mapping to these polygons based on the calculation result of the signal processor 11", [0018] where pasting is part of rendering process).

Regarding the "means plus function" language, the means refer to the software methods executed on generically disclosed hardware explicitly disclosed by Higashiyama. It is further noted that both software and hardware means are functionally equivalent.

8.   As per claim 7, since Higashiyama's system is an image processing apparatus with memory (Figure 1 19) it is obvious that his system has the memory containing the program to perform the functions as discloses in claim 1 and, therefore, is similarly rejected as claim 1.

9.   Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Higashiyama as applied to claim 1 above.

As per claim 10, Higashiyama demonstrated all the elements as applied to the

rejected independent claim 1, supra, and further disclose acquiring inner product values

of the direction of a light source and normal line of the divided polygons, wherein the

polygons intersecting the boundary line are determined as polygons having different

polarities of the acquired inner product values (Figure 5A Since the shading of all

polygons are determined by the inner product of their normal vectors and light source,

some adjacent polygons having different polarities form the boundary of the shade).

10.   As per claim 11, Higashiyama demonstrated all the elements as applied to the

rejected independent claim 4, supra, and further disclose acquiring inner product values

of the direction of a light source and normal line of the divided polygons, wherein the

polygons intersecting the boundary line are determined as polygons having different

polarities of the acquired inner product values (Figure 5A Since the shading of all

polygons are determined by the inner product of their normal vectors and light source,

some adjacent polygons having different polarities form the boundary of the shade).

11.   As per claim 12, since Higashiyama's system is an image processing apparatus

with memory (Figure 1 19) it is obvious that his system has the memory containing the

program to perform the functions as discloses in claim 10 and, therefore, is similarly

rejected as claim 10.

Claim Rejections - 35 USC § 103

12.   The text of those sections of Title 35, U.S. Code not included in this action can

be found in a prior Office action.

13.   Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Higashiyama et al. as applied to claim1 above.

As per independent claim 3, Higashiyama demonstrated all the elements as

applied to the rejection of independent claim 1, supra, and further discloses

Acquiring inner product values of the direction of a light source and normal lines

of the divided polygons, wherein the polygons intersecting the boundary line are

determined as polygons having different polarities of the acquired inner product values

("It can be seen that if an inner product of the normal vector V2 at the vertex and the

light source vector V1 is positive, i.e. an X-component of the normal vector V2 at this

vertex is facing in the same direction as the light source vector V1, this vertex is a

hidden-surface vertex M02", [0056] line 7-12);

Wherein intersectional position of a side line of a polygon intersecting the

boundary line is acquired from a proportional relational relation with the inner product

values of two apexes of the side line of the polygon intersecting the boundary lines

when the inner product value is at the intersectional position is set "0" (If the inner

product is smaller than "0", this vertex is a vertex upon which rays from the light source

are projected ... On the other hand, if the inner product is larger than "0", this vertex is a

vertex upon which no ray from the light source is projected, [0042] [0043]. It is noted

that Higashiyama does not explicitly disclose the intersectional position is set to "0",

however, since the normal product of one side of polygon can be facing the light if it is

less than "0" and the normal product of one side of polygon can be facing away from the

light if it is greater than "0", it would have been obvious to one of ordinary skill in the art

to set "0" as the boundary line between the light and shade in order to set the boundary

of the shade).

14.   As per independent claim 6, Higashiyama demonstrated all the elements as

applied to the rejection of independent claim 4, supra, and further discloses

the control means acquiring inner product values of the direction of a light source

and normal lines of the divided polygons, wherein the polygons intersecting the

boundary line are determined as polygons having different polarities of the acquired

inner product values ("It can be seen that if an inner product of the normal vector V2 at

the vertex and the light source vector V1 is positive, i.e. an X-component of the normal

vector V2 at this vertex is facing in the same direction as the light source vector V1, this

vertex is a hidden-surface vertex M02", [0056] line 7-12); and

intersectional position of a side line of a polygon intersecting the boundary line is

acquired from a proportional relational relation with the inner product values of two

apexes of the side line of the polygon intersecting the boundary lines when the inner

product value is at the intersectional position is set "0" (If the inner product is smaller

than "0", this vertex is a vertex upon which rays from the light source are projected ...

On the other hand, if the inner product is larger than "0", this vertex is a vertex upon

which no ray from the light source is projected, [0042] [0043]. It is noted that

Higashiyama does not explicitly disclose the intersectional position is set to "0",

however, since the normal product of one side of polygon can be facing the light if it is

less than "0" and the normal product of one side of polygon can be facing away from the

light if it is greater than "0", it would have been obvious to one of ordinary skill in the art

to set "0" as the boundary line between the light and shade in order to set the boundary

of the shade).

15.   As per claim 11, Kawasaki demonstrated all the elements as applied to the

rejected independent claim 4, supra.

Kawawsaki discloses a method of forming a polygon image by sorting and

subdividing a plurality of polygons into two colors. It is noted that Kawasaki does not

explicitly disclose the step of acquiring inner product values of the direction of a light

source and normal line of the divided polygons, wherein the polygons intersecting the

boundary line are determined as polygons having different polarities of the acquired

inner product values, however, this is known in the art as taught by Gelb et al.,

hereinafter Gelb. Gelb discloses a method of rendering polygons in which a D

parameter is derived to decide if the polygons is facing front or back of the light source

("The third parameter D is typically the result of projecting he user-defined vector onto

the vertex normal vectors. For front facing polygons, D will be positive and for back

facing polygons, D will be negative", column 6, line 45-48).

Thus, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to incorporate the teaching of Gelb into Kawasaki because

Kawasaki discloses a method of forming a polygon image and Gelb discloses the

polygon is to be shaded by calculating the inner product of the light vector and the

polygon normal in order to determine the orientation of the polygon.

16.   As per claim 12, since Kawasaki and gelb's system is an image processing

apparatus with memory (Figure 2 11) it is obvious that his system has the memory

containing the program to perform the functions as discloses in claim 10 and, therefore,

is similarly rejected as claim 10.

Response to Arguments

17.   Applicant's arguments with respect to claims 1, 3-4, 6-7 and 9-12 have been

considered but are moot in view of the new ground(s) of rejection.

Conclusion

18.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

Inquiries

19.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to **Ryan Yang** whose telephone number is **(703) 308-**

6133.

        If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, **Michael Razavi**, can be reached at **(703) 305-4713**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal

Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the Technology Center 2600 Customer Service Office

whose telephone number is (703) 305-47000377.

Ryan Yang
November 30, 2003

MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600